

REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1 and 3-7 are currently pending in this application. No new matter has been added by way of the present amendment. For instance, the amendment to claim 1 is supported by previously presented claim 2, now cancelled, as well as the Specification at, for example, paragraphs [0031] and [0036]. New claims 5 and 6 are supported by paragraph [0031] of the Specification. New claim 7 finds support at paragraph [0029]. The Specification has been amended to correct an obvious typographical error. Accordingly, no new matter has been added.

In view of the amendments and remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

Issues Under 35 U.S.C. 102/103

Claims 1-4 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lei et al. (U.S. 6,494,955) (hereinafter Lei '955). Applicants respectfully traverse.

The Examiner asserts that Lei '955 discloses a CVD apparatus comprising a gas supply member, a heating member, a heat uniformizing member, and a wafer containing member having a dome-shaped recess. The Examiner further asserts that Lei '955 teaches that the configuration of the recess is correlated to the temperature distribution of the substrate. Thus, the Examiner notes that “[i]t is obvious that the ratio of height and diameter of the recess would be an optimizable feature.” Moreover, the Examiner argues that “[r]egarding the recess portion being

depressed in a dome shape at a back side of the wafer it is noted that the recess is dome shaped according to the plurality of stepped surfaces with varying depth. Further maximum depth is .003 and considering a standard 300 mm substrate the ratio will be in the claimed range."

Initially, Applicants note that claim 2 has been cancelled by way of the present amendment. Accordingly, the rejection of this claim is moot.

As to claims 1 and 3-4, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of anticipation. For anticipation under 35 U.S.C. §102, the reference must teach each and every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993). To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present". *In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999). The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

*Id.*

Moreover, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the invention. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co.*

v *Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rationale underpinning to support the legal conclusion of obviousness. *KSR Int'l Co. v Teleflex Inc.*

Claim 1 is directed, *inter alia*, to a vapor phase growth apparatus comprising a sealable reactor, a wafer containing member having a wafer mounting portion, a gas supply member, a heating member and a heat uniformizing member. In the present invention, a recess portion is formed at a back side of the wafer containing member, and the recess portion is formed so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member. Moreover, the present wafer containing member comprises a material having a heat conductivity of from 50W/mK to 500W/mK. Additionally, a ratio H/D (height and diameter of the recess portion) is maintained at a very specific ratio. Lei '955 fails to teach or suggest an apparatus as claimed.

Lei '955 discloses a substrate support assembly for supporting a substrate during processing, comprising top and bottom ceramic plates, a ring, a stepped surface and an electrode. However, Lei '955 does not teach or suggest a "recess portion depressed in a dome shape" as presently claimed (see, e.g., claim 1).

The definition of "dome" is well known in the art. A "dome" is defined as "a concave shape whose distinguishing characteristic is that the concavity faces downward" (see <http://dictionary.reference.com/browse/dome>). Evidently, the area which the Examiner calls a "dome" in Lei '955 cannot possibly be a dome.

Moreover, Lei '955 fails to teach an apparatus comprising a wafer containing member comprising a material having a heat conductivity of from 50W/mK to 500W/mK, a recess portion height (H) of 0.02mm to 3.55mm, or an H/D ratio (ratio of the height and diameter of the recess portion) of 0.01 to 2.10%.

Clearly, Lei '955 fails to teach each and every limitation of the present invention and thus fails to anticipate the same. Moreover, Applicants submit that one skilled in the art would not have been motivated to modify the teachings of Lei '955.

The Examiner's attention is respectfully directed to paragraphs [0030]-[0033] of Applicants' Specification, which show that superior and unexpected results are obtained by the presently claimed apparatus. This evidence of superior and unexpected results rebuts any *prima facie* case of obviousness arguably established by the Examiner.

Clearly, Lei '855 fails to anticipate or render obvious the present invention. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

**Issues Under 35 U.S.C. 103(a)****Gurary '183**

Claims 1-4 stand rejected under 35 U.S.C. 103(a) as being obvious over Gurary et al. (U.S. 6,001,183) (hereinafter Gurary '183). Applicants respectfully traverse.

The Examiner asserts that Gurary '183 teaches a deposition apparatus comprising a heat assembly, a wafer containing member and a susceptor or uniformizing member. The Examiner notes that "[r]egarding H/D ratio...the dimensions could be optimized to compensate for non uniform loss of heat from the wafer through supporting structure".

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Gurary '183 teaches a wafer carrier/susceptor combination for use in an epitaxial deposition process. However, Gurary '183 does not teach or suggest a "recess portion depressed in a dome shape", as presently claimed (see, e.g., claim 1). Figures 14 and 15 of Gurary '183 teach spherical curved profiles formed in the apparatus of Gurary '183 (see also column 13, lines 20-62). However, these spherical curved profiles do not fall within the definition of a "dome" (discussed above).

Moreover, Gurary '183 fails to teach an apparatus comprising a wafer containing member comprising a material having a heat conductivity of from 50W/mK to 500W/mK, a recess portion height (H) of 0.02mm to 3.55mm, or an H/D ratio (ratio of the height and diameter of the recess portion) of 0.01 to 2.10%.

Clearly, Gurary '183 fails to teach or suggest each and every limitation of the present invention. For this reason alone, this rejection should be withdrawn.

Moreover, as noted above, the present invention achieves superior and unexpected results, which rebut any *prima facie* case of obviousness arguably established by the Examiner (see Specification, [0030]-[0033]).

Because the invention, as set forth in Applicants' claims, is not disclosed or made obvious by the cited prior art, reconsideration and withdrawal of this rejection are respectfully requested.

#### **AAPA in view of secondary references**

Claims 1-4 stand rejected under 35 U.S.C. 103(a) as being obvious over Applicants' admitted prior art ("AAPA") in view of Yoshiyuki Kamata et al. (JP 06124901) (hereinafter Yoshiyuki '901) as evidenced by Eiichi Shimizu (WO 2003/107403) (hereinafter WO '403). Additionally, claims 1-4 stand rejected under 35 U.S.C. 103(a) as being obvious over AAPA in view of Bader et al. (U.S. 2004/0187790) (hereinafter Bader '790). Applicants respectfully traverse.

The Examiner asserts that AAPA teaches all the limitations of the present claims, except for "a recess portion depressed in a dome shape at a back of the wafer containing member so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member". The Examiner, however, relies on the teachings of Yoshiyuki '901, WO '403 and Bader '790 in an attempt to overcome these deficiencies.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Distinctions between the present invention, Yoshiyuki '901 and WO '403

have been placed before the Examiner in the past (see Response to Office Action filed on July 11, 2008). Applicants submit the following additional comments.

As noted above, the present invention requires a wafer containing member, and a recess portion at a back side of the wafer containing member so that an apex of a dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of a heating uniformizing member. Moreover, the present invention requires that the wafer containing member comprises a material having a heat conductivity of from 50W/mK to 500W/mK.

In Yoshiyuki '901, quartz is used as a spacer. Heat conductivity of a quartz glass is about 2 W/mK, whereas heat conductivity of a crystal is less than 10 W/mK. Thus, the heat conductivity of quartz is much smaller than that of the material used for the wafer containing member of the present invention. As a result, the heat uniformity achieved in the present invention cannot be attained with the apparatus of Yoshiyuki '901.

Moreover, in the present invention, the temperature difference  $\Delta T$  between the center portion and the edge portion of the wafer containing member is 15°C or less, preferably 5°C or less (see new claim 5 and 6). Furthermore, the variation in the in-plane temperature distribution on the surface of the wafer is smaller than or equal to 1°C (see new claim 7). In the present invention, the wafer itself has heat conductivity and heat capacity.

Yoshiyuki '901 discloses an emission wavelength distribution of 0.01 gm or smaller. Based on FIG. 1 of Yoshiyuki '901, the temperature variation of the substrate surface is thus about 5°C, which causes a much greater temperature deviation on the spacer surface which the wafer contacts. In stark contrast, the present invention exhibits a much smaller temperature variation on the wafer surface and is thus more effective.

Additionally, in Yoshiyuki '901, the curvature radius of the dome shape portion formed at the lower surface of the quartz spacer is 300mm. However, in the present invention, when the diameter of the recess portion of the wafer holder is 170mm, the curvature radius is between 1000mm and 18000mm (1000mm when the height is 3.5mm, 1450mm when the height is 2.5mm, 4000mm when the height is 0.9mm, and 18000mm when the height is 0.02mm), because the height of the recess portion is maintained within a range of 0.02 to 3.5mm (see claim 1). Thus, in the present invention, the recess portion is controlled to a smaller curvature.

As to Bader '790, Applicants submit that this reference also fails to teach or suggest a vapor phase growth apparatus as claimed, comprising a sealable reactor, a wafer containing member having a wafer mounting portion, a gas supply member, a heating member and a heat uniformizing member, wherein a recess portion is formed at a back side of the wafer containing member so that an apex of the dome shape is arranged on a straight line connecting a center of the wafer containing member with a center of the heating uniformizing member, the wafer containing member comprises a material having a heat conductivity of from 50W/mK to 500W/mK, and a ratio H/D (height and diameter of the recess portion) is maintained at a very specific ratio.

Because the invention, as set forth in Applicants' claims, is not disclosed or made obvious by the cited prior art, reconsideration and withdrawal of this rejection are respectfully requested.

**Conclusion**

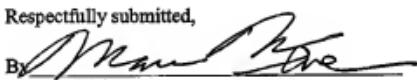
All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Vanessa Perez-Ramos, Reg. No. 61,158, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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